

What is Claimed Is

1. An isolated serine protease inhibitor which inhibits chymotrypsin and elastase but does not inhibit trypsin.

2. The isolated protease inhibitor of claim 1 wherein the inhibitor has the following amino acid sequence:

Leu Asp Pro Val Asp Thr Pro Asn Pro Thr Arg Arg Lys
Pro Gly Lys Cys Pro Val Thr Tyr Gly Gln Cys Leu Met
Leu Asn Pro Pro Asn Phe Cys Glu Met Asp Gly Gln Cys
Lys Arg Asp Leu Lys Cys Cys Met Gly Met Cys Gly Lys
Ser Cys Val Ser Pro Val Lys Ala.

3. The isolated protease inhibitor of claim 1 wherein the inhibitor has the following amino acid sequence:

Leu Asp Pro Val Asp Thr Pro Asn Pro Thr Arg Arg Lys
Pro Gly Lys Cys Pro Val Thr Tyr Gly Gln Cys R₈ R₃
R₉ Asn Pro Pro Asn Phe Cys Glu R₄ Asp Gly Gln Cys
Lys Arg Asp Leu Lys Cys Cys R₅ Gly R₆ Cys Gly Lys
Ser Cys Val Ser Pro Val Lys R₇

wherein R₇ is alanine, and

R₃, R₄, R₅, R₆, and R₈ are the same or different amino acids and are selected from the group consisting of methionine, valine, alanine, phenylalanine, tyrosine, tryptophan, lysine, glycine, and arginine.

4. The isolated protease inhibitor of claim 3, wherein R₈ is phenylalanine.

5. The isolated protease inhibitor of claim 3, wherein R₈ is glycine.

6. The isolated protease inhibitor of claim 3, wherein R₈ is valine.

7. An isolated nucleic acid which encodes a serine protease inhibitor of claim 1.

8. The isolated nucleic acid of claim 7 which encodes a serine protease inhibitor having the following amino acid sequence:

Leu Asp Pro Val Asp Thr Pro Asn Pro Thr Arg Arg Lys
Pro Gly Lys Cys Pro Val Thr Tyr Gly Gln Cys Leu Met
Leu Asn Pro Pro Asn Phe Cys Glu Met Asp Gly Gln Cys
Lys Arg Asp Leu Lys Cys Cys Met Gly Met Cys Gly Lys
Ser Cys Val Ser Pro Val Lys Ala.

9. The isolated nucleic acid of claim 7 which encodes a serine protease inhibitor having the following amino acid sequence:

Leu Asp Pro Val Asp Thr Pro Asn Pro Thr Arg Arg Lys
Pro Gly Lys Cys Pro Val Thr Tyr Gly Gln Cys R₈ R₃
R₉ Asn Pro Pro Asn Phe Cys Glu R₄ Asp Gly Gln Cys
Lys Arg Asp Leu Lys Cys Cys R₅ Gly R₆ Cys Gly Lys
Ser Cys Val Ser Pro Val Lys R₇

wherein R7 is alanine, and

R3, R4, R5, R6, and R8 are the same or different amino acids and are selected from the group consisting of methionine, valine, alanine, phenylalanine, tyrosine, tryptophan, lysine, glycine, and arginine.

10. The isolated nucleic acid of claim 8, wherein said nucleic acid has the following nucleotide sequence:

CTG GAT CCT GTT GAC ACC CCA ACA CCA ACA AGG AGG AAG
CCT GGG AAG TGC CCA GTG ACT TAT GGC CAA TGT TTG ATG
CCT AAC CCC CCC AAT TTC TGT GAG ATG GAT GGC CAG TGC
AAG CGT GAC TTG AAG TGT TGC ATG GGC ATG TGT GGG AAA
TCC TGC GTT TCC CCT GTG AAA GCT.

11. A method for recombinant production of a serine protease inhibitor having at least one active site possessing serine protease inhibitory activity comprising:

(a) preparing a nucleic acid capable of directing a host organism to produce a protein comprising the amino acid sequence:

Leu Asp Pro Val Asp Thr Pro Asn Pro Thr Arg Arg Lys
Pro Gly Lys Cys Pro Val Thr Tyr Gly Gln Cys R₈ R₃ R₉
Asn Pro Pro Asn Phe Cys Glu R₄ Asp Gly Gln Cys Lys
Arg Asp Leu Lys Cys Cys R₅ Gly R₆ Cys Gly Lys Ser Cys
Val Ser Pro Val Lys R₇,

wherein

R₇ is alanine, and

R₃, R₄, R₅, R₆, R₈, and R₉ are the same or different and are selected from the group consisting of methionine, valine, alanine, phenylalanine, tyrosine, tryptophan, lysine, glycine and arginine.

(b) Cloning the nucleic acid into a vector capable of being transferred into and replicating in a host microorganism, such vector containing operational elements for the nucleic acid;

(c) Transferring the vector containing the nucleic acid and operational elements into a host microorganism capable of expressing the serine protease inhibitor;

(d) Culturing the host microorganism under conditions appropriate for amplification of the vector and expression of the inhibitor;

(e) Harvesting the inhibitor; and

(f) Permitting the inhibitor to assume an active tertiary structure whereby it possesses serine protease inhibitor activity.